

1. (Currently Amended) A mini-fan that comprises:
a drive motor (20) having an external rotor (22; 222) and an internal stator (44; 244), the external rotor being equipped with a rotor shaft (34; 234) that has a necked-down portion (58; 258) adjacent its free end (35; 235);
a thrust bearing cooperating with said free end;
a bearing tube (38; 238) having
a rotor-side end and
a bearing-side end, close to said thrust bearing;
a fan housing (74) having a support flange (78) for said drive motor (20), formed with an opening (80) to receive said bearing tube (38, 238), said bearing tube being provided, on ~~a~~ the bearing-side end remote from said external rotor (22, 222), with a radial projection (39) which which abuts against a shoulder of provided at said bearing-tube-receiving opening (80);
said internal stator (44; 244) being secured to an exterior of said bearing tube, there being arranged, within said bearing tube, a bearing arrangement (36; 236) in which said rotor shaft (34; 234) is rotatably supported;
a closure arrangement (62; 262) that closes off the bearing tube (38; 238) in a liquid fluid-tight manner at its bearing-side end, and is equipped, adjacent the necked-down portion (258) of the rotor shaft (234), with at least one resilient radially movable latching member (60; 260), acting as a detent, for engaging into that necked-down portion (58; 258) of the rotor shaft (234) without disturbing normal operation of said rotor shaft (34; 234) and thereby preventing any non-destructive pulling of said rotor shaft out of said bearing arrangement (36; 236), said radially movable latching member being integrally formed with said closure arrangement (62; 262); and said radially movable latching member (60, 260) being integrally formed;

and

wherein said closure arrangement is composed, at least partly, of a thermoplastic material transparent to laser light, and a cover portion (62) is secured to said support flange (78) by a substantially fluid-tight laser-welded connection (100, 102).

2. (Cancelled)
3. (Cancelled)
4. (Cancelled)

5. (Currently Amended) The mini-fan according to claim 1 ,
wherein

the bearing tube (38) is pressed in a substantially ~~liquid~~
fluid-tight manner into ~~an~~ the bearing-tube-receiving opening (80)
formed in the flange (78).

6. (Previously Presented) The mini-fan according to claim 5,
wherein

the bearing tube (38) consists essentially of metal, and is
epilam-coated on its side that is pressed into the flange opening
(80).

7. (Currently Amended) The mini-fan according to claim 1,
wherein

~~the bearing tube (30) is equipped with a said~~ radial projection
(39) ~~that~~ is held in a positively engaged manner between
the closure arrangement (62) and a portion of the flange (78).

8. (Previously Presented) The mini-fan according to claim 7, wherein the radial projection is implemented as a flange (39).

9. (Previously Presented) The mini-fan according to claim 8, wherein

the flange (39) is provided on an end portion of the bearing tube (38).

10. (Previously Presented) The mini-fan according to claim 1, wherein the rotor shaft (34; 234) comprises

a free end (35; 235), facing away from the rotor (22; 222), on which a tracking cap (68; 268) is formed for axial support;

and wherein a support surface (66; 266) for that tracking cap is provided on the closure arrangement (62; 262).

11. (Original) The mini-fan according to claim 10, wherein the support surface is implemented as a depression (66; 266) and is equipped with a lubricant (110).

12. (Previously Presented) The mini-fan according to claim 1, wherein the at least one resilient latching member (60; 260) protrudes into the necked-down portion (58; 258) of the rotor shaft (34; 234) without touching it.

13. (Previously Presented) The mini-fan according to claim 12, wherein

there is provided, adjacent the free end of the shaft (34; 234), a spreading member (35; 235) that is implemented to deflect the at least one resilient latching member (60; 260) in a radial direction upon installation of the shaft (34; 234).

14. (Previously Presented) The mini-fan according to claim 10, wherein

the tracking cap (68; 268) is acted upon by a magnetically generated force urging said rotor shaft in a direction toward the closure arrangement (62; 262).

15. (Previously Presented) The mini-fan according to claim 1, wherein

the closure arrangement is implemented as a plug that is mounted in an opening of the bearing tube.

16. (Previously Presented) The mini-fan according to claim 15, wherein

the closure arrangement is pressed in a liquid-tight manner into the opening of the bearing tube (238).

17. (Previously Presented) The mini-fan according to claim 15, wherein

at a transition point (271, 283) between the bearing tube (238) and plug (262), there is implemented on one of those parts an annular ridge (284, 285) and on the other part an annular groove (272, 273) complementary thereto, which together form a latching connection when the plug (262) is installed.

18. (Previously Presented) The mini-fan according to claim 15, wherein

the bearing tube (238) has a larger inside diameter at its portion (271) provided for reception of the plug (262) than at its portion (240) provided for reception of the bearing arrangement (236).

19. (Previously Presented) The mini-fan according to claim 1, wherein

the bearing tube (238) comprises a portion (278) that protrudes away from the rotor (222) and is implemented for installation in an opening (280) of a component (217).

20. (Previously Presented) The mini-fan according to claim 1, wherein the internal stator (44; 244) comprises a lamination stack (45; 245) on which is arranged a coil former (46; 246) having a stator winding (247), and mounted on that coil former is at least one rigid electrical conductor (132; 288) that is electrically connected to the stator winding (247) and extends substantially parallel to the rotation axis (41; 241) of the mini-fan.

21. (Original) The mini-fan according to claim 20, wherein the bearing tube (238) comprises an outwardly protruding flange (239) that is equipped with an orifice (292) for the passage of the rigid electrical conductor (288).

22. (Previously Presented) The mini-fan according to claim 1, wherein the internal stator (44; 244) comprises a lamination stack (45; 245) and the external rotor (22; 222) comprises a permanent magnet (28; 228) coacting with the internal stator, said magnet being offset relative to the lamination stack (45; 245) of the internal stator (44; 244) in such a way that a magnetic force is generated which acts upon the tracking cap (68; 268) in a direction toward the support surface (66; 266).

23. (Currently Amended) The mini-fan according to claim 1, wherein an end portion (32; 232) of the shaft (34; 234) is joined to the rotor (20) and in ~~said~~ a transition region from the shaft (34; 234) to the rotor (20), and a lubricant-moving surface (112; 312) is provided, which extends approximately radially and is located inside the bearing tube (38; 238), so that lubricant (110) thrown off during operation from said lubricant-moving surface, upon rotation of the fan wheel, is thrown into the interior of the bearing tube (38; 238).

24. (Previously Presented) The mini-fan according to claim 1, wherein said lubricant-moving surface (112; 312) is implemented in undercut fashion.

25. (Previously Presented) The mini-fan according to claim 23, wherein the bearing tube (38; 238) comprises, adjacent its rotor-side end facing away from the cover (62; 262), an inwardly protruding portion (114; 314).

26. (Previously Presented) The mini-fan according to claim 25, wherein the inwardly protruding portion (114; 314) is separated from the rotor (20) at least locally by a gap (116; 316) that is implemented in the manner of a capillary gap, in order to minimize escape of lubricant (110) through that gap.

27. (Previously Presented) The mini-fan according to claim 25, wherein the inwardly protruding portion is implemented, on its side facing toward the closure arrangement (62; 262), in the manner of an undercut (114; 314).

28. (Currently Amended) The mini-fan according to claim 1, wherein said bearing arrangement (36; 236) is arranged located in the bearing tube (38; 238), said tube comprising, on its inner side, a portion (138) of reduced diameter for reception of the bearing (36; 236).

29. (Currently Amended) The mini-fan according to claim 1,
further comprising
~~a housing (74) that is equipped with a flange portion (78) that
is formed with a flange opening (80), having a cover (62) for closing
off that flange opening (80),~~

~~—~~ further having
a joint (100, 102) provided between the support flange portion
(78) and the cover portion (62),

the bearing tube (38) being held in a positively engaged manner
between the cover portion (62) and the support flange portion (78).

30. (Previously Presented) The mini-fan according to claim 29,
wherein the bearing tube (38) is pressed in ~~a~~ substantially
liquid-tight manner into the flange opening (80).

31. (Previously Presented) The mini-fan according to claim 29,
wherein the bearing tube (38) is equipped with a flange (39)
that is held in a positively engaged manner between the cover (62) and
the flange portion (78).

32. (Cancelled)

33. (Previously Presented) The mini-fan according to claim 29,
wherein the shaft (34) of the fan comprises a free end (35);
and a holding apparatus (60) that is implemented to retain that
free end (35) is provided on the cover (62).

34. (Currently Amended) The mini-fan according to claim 29,
wherein the shaft (34) of the fan has a free end (35) that is equipped
with a tracking cap (68) associated with which is a corresponding
depression (66) in the cover (62), said depression forming,
together with the tracking cap (68), a said thrust bearing for the
shaft (34).

35. (Previously Presented) The mini-fan according to claim 5,
wherein the bearing tube (38) is formed with
a constriction (37) in which said bearing (36) is mounted.

36. (Original) The mini-fan according to claim 35,
wherein the inner side (40) of the constriction (37)
has a better-machined surface than other, unconstricted portions
of the inner side of the bearing tube (38).

37. (Cancelled)

38. (Currently Amended) The mini-fan according to claim 28,
wherein the bearing (36) comprises a portion (42) having an
enlarged outside diameter, ~~which said~~ outside diameter corresponding to
approximately to the reduced inside diameter of the bearing tube (38)
in order to permit mounting of the bearing (36) in the bearing tube
(38) in the region of that portion (42) having an enlarged outside
diameter.

39. (Currently Amended) The mini-fan according to claim 38,
wherein the bearing surfaces (48, 50) of the ~~sintered~~ bearing
(36) are located substantially outside the portion (42) having an
enlarged inside outside diameter.

40. (Currently Amended) The mini-fan according to claim 38,
wherein the bearing surfaces (48, 50) of the ~~sintered~~ bearing
(36) are located substantially at locations that are located outside
the locations at which the ~~sintered~~ bearing (36) is held in the
bearing tube (38).

41. (Currently amended) The mini-fan according to claim 38,
wherein the shaft (34) comprises a free end (35) facing away from
the rotor,
and near this free end (35), at least one closure member (62)
is provided which seals that end (39) of the bearing tube (38)
in a substantially liquid-tight manner.

42. (Original) The mini-fan according to claim 41,
wherein a lubricant supply (64) is provided in the region of the
sealed end (39) of the bearing tube (38).

43. (Previously Presented) The mini-fan according to claim 41,
wherein the shaft (34) is equipped in the region of its free end
(35) with a tracking cap (68), associated with which in the closure
member (62) is a corresponding running surface (66) that, together
with the tracking cap (68), forms an axial said thrust bearing for the
shaft (34).

44. (Currently Amended) The mini-fan according to claim 38,
wherein the shaft (34) comprises a free end (35) facing away from
the rotor,

and, in the region of that free end (35), an annular groove (58)
is provided, into which protrudes, in the assembled state, a
said resilient latching member (60) that is mechanically connected to
the housing of the mini-fan.
~~and counteracts pulling of the installed shaft (34) out of the
bearing (36).~~

45. (Cancelled)